

ARE WE TO LEAD OR FOLLOW? ESTABLISHING A ROLE FOR THE FORESTRY COMMUNITY

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INTRODUCTION

The Brundtland Report (WCED 1987) gave the idea of sustainable development wide acceptance in the popular press and technical journals. Sustainable forestry admits of many meanings, and no fewer than 17 international efforts are underway to define it (Backiel 1995; Mangold 1995; WBCSD 1996). In the context of development, sustainability is a dynamic process of change toward use of natural resources in which the needs of future generations are considered while meeting present needs. It is this central notion of meeting needs, particularly the essential needs of the world's poor, that advances sustainable forestry beyond ecosystem management (Toman and Ashton 1996). Another key concept in the Brundtland Report was that the environment, social organization, and available technology impose limitations on our ability to meet present and future needs.

Increasingly, emphasis in discussion of forest policy is placed on environmental and social issues to the seeming exclusion at times of timber production (Christensen et al. 1996). Nevertheless, all attempts at defining sustainability agree that flows of goods and services from forest ecosystems must be sustained, including timber and non-wood products as well as ecosystem services. Another common theme is the conservation of biological diversity at all scales: genetic diversity within a species; species diversity within communities; and ecosystem diversity across landscapes. Finally, the social and economic impacts of sustainable management must be positive, for local communities and the national economy. Thus national policies that sell timber concessions without regard to the customary rights of indigenous peoples are clearly not sustainable, nor are national policies that suddenly constrain timber flows from public land without regard to the needs of timber-dependent communities.

In this paper I attempt to describe a role for the forestry community in Pennsylvania to play in the evolving debate over what practices constitute sustainable forestry. The forces driving this debate at the global level -- population, affluence, and technology (Ehrlich and Holdren 1974; Goodland and Daly 1996) -- directly influence the choices available in Pennsylvania, although most factors are outside our control. World population, for example, is increasing although the rate of increase has declined since the 1960s. Nevertheless, world population is expected to double within the next century

(Forest Products Society 1993). While the highest rates of increase are found in the developing nations, populations are growing in many industrialized countries. The United States, for example, is growing at the rate of 1.1% annually, which translates into a doubling of population in 63 years (Bowyer 1992, 1994). Not only will this increased population need more wood, it will also need more land for other purposes that will likely be converted from forestland. It is against the backdrop of increased demand that I will define sustainable forest management.

INCREASED DEMAND

Recent attempts to forecast for products and services from forests project demand for wood products to increase at a moderate 1% to 2% annually (Solberg et al. 1996). Much of this increased demand will be driven by increases in per capita consumption of wood products in developing countries (Solberg et al. 1996; WBSCD 1996). Technological innovation will dampen increases somewhat. Changes in product mixes, improvements in manufacturing efficiencies, and increased use of recovered (i.e., recycled) fiber will slow the rate of increase in demand, not offset increases (Solberg et al. 1996). Increased affluence, particularly in developing countries, will also lead to increased demand for non-timber goods and services such as recreation.

Projected increases in fiber supply should meet this demand, provided no additional regulatory constraints are placed on supply (Solberg et al. 1996; WBSCD 1996). Plantation grown fiber will play an increasingly important role. Continued development of plantations in the tropics and sub-tropics, where high growth rates are common, is critical to future supply. Although some question their sustainability, plantations are generally established on degraded agricultural land and serve to reduce pressure to supply fiber from harvesting natural forests (Solberg et al. 1996; WBSCD 1996). Recent experience in Latin America, however, points out the risks of this strategy. There 20,000 hectares of Gmelina plantation were abandoned by a large paper company after the national government placed unreasonable limitations on harvesting.

The likely impact on fiber prices of increased demand could be increases in real prices (Solberg et al. 1996; WBSCD 1996). Increased fiber costs should stimulate the necessary investments in regeneration and afforestation that will increase supply. Increased fiber costs should result in improvements in processing efficiency.

Constraints due to environmental regulation in one region or nation can lead to more costly production or environmental degradation elsewhere (WBSCD 1996). Bowyer (1991, 1994) pointed out the need to view sustainability in a truly global context. He questioned the ethical position of those who seek to preserve large areas of public forest land in the U.S. without regard to the impact of shifting demand for fiber to developing nations. In many developing countries, lax enforcement of environmental regulations leads to degraded forests or spontaneous conversion to subsistence farming following

harvesting of the natural forest.

What are the implications for sustainability of this rising demand for wood and other services from forests? First, we must invest more in forest management (Solberg et al. 1996; WBSCD 1996). Overall costs of sustainable forestry will be higher, as much as 10% to 20% (WBSCD 1996). By the estimate of one company, merely obtaining green certification for their timberlands would require at least a 10% increase in prices to cover the added costs (J.D. Hodges, VP Anderson Tully Co., personal communication 1997). Investments to increase production through intensified management must be made where productivity is high, sites are responsive to increased inputs, and environmental impacts are negligible. Second, we must insure that an adequate land base exists for forests, as well as for other needs. This may require investments in restoration of degraded land rather than conversions from natural forests to plantations, or from forest or pasture to cropped land (Lee 1996). Third, we must develop a consensus on forest management policies, possibly by increasing effective dialogue among interested parties, and by strengthening institutions for resource management, land use, research, education, and extension.

SUSTAINABLE FORESTRY

In my view, sustainable forestry has three dimensions: it must be silviculturally and ecologically sound, economically feasible, and socially acceptable. This leads me to conclude that sustainability will be locally defined (Swanston and Franklin 1992; Brunson 1993). No single model or set of criteria can define sustainable practices that are appropriate to all forest types, in all nations in various stages of economic development, or in all cultures or political systems. Nevertheless, I think for sustainable forestry to have meaning, some general principles must apply at appropriate spatial scales in all situations.

Biological Sustainability

The silvicultural and ecological soundness of forest management can be assessed against three criteria.

- Is site productivity maintained? If soil physical or chemical properties are degraded, such as compaction from harvesting equipment, then long-term site productivity will be diminished. If hydrological or biogeochemical processes are altered, site productivity may be diminished or improved depending upon site conditions. For example, bedding poorly drained Spodosols improves productivity by expanding the rooting zone of aerobic soil. Bedding well-drained Entisols, however, may give a short-term benefit (probably due to competition control) but leads to accelerated erosion and lowered productivity over the long-term.
- Forest management is not sustainable if regeneration is not assured. Adequate regeneration following stand renewal is often a problem where managers rely on

natural regeneration, usually in terms of desirable species composition (e.g., Loftis and McGee 1993). Where artificial regeneration is the rule, a lack of investment in regeneration following harvest may be the sustainability issue.

Conservation of biodiversity and maintenance of ecosystem health are issues best considered at the landscape scale, and sustainability must be assessed in terms of the cumulative impact of many separate decisions made at the stand level, often by different landowners. Stands should be managed to maximize the range and sum of benefits available by providing complex vertical structure. Defining meaningful criteria at the landscape level for sustainability where land is primarily privately owned is problematic. Criteria and indicators for diversity and forest health being considered by international bodies do not apply well to landscapes where ownership is predominantly private, as in the eastern United States. One approach is to conserve overall species and community diversity and provide habitat for species of concern by zoning for production, conservation, and preservation forests. This approach calls for new institutional arrangements of voluntary landowner associations, incentives, and possibly mechanisms to redistribute income and costs between landowners.

Economic Sustainability

The economic feasibility of sustainable forestry must be assessed at two levels, both the macro (i.e., national or state) and the micro (i.e., individual firm or landowner). As noted above, there must be a stable land base for forestry, particularly for intensively managed production forests. Intensification of management must be allowed within the regulatory framework, and investments in management must not be at risk from overzealous regulation of harvesting in the future. I have argued elsewhere (Stanturf et al. 1993) that we need a national commitment to fiber self-sufficiency or risk losing our pulp and paper industry overseas. The point is that owning forest land and managing for commodity production must be profitable. Regulation of forest management practices will not be sustainable if landowners cannot recoup investments made, plus profit.

We must recognize, however, that land ownership comes not only with rights but obligations attached. The public has strong feelings about the appearance of forests, and it matters to most people whether some condition was caused by nature or human intervention (Brunson 1993). The distinction between public and private ownership of forests is blurred (Stanturf et al. 1993). The public feels the right to have a say in how all forests are managed. The costs and benefits of non-market values associated with forest land (e.g., biodiversity, aesthetics, and ecological services such as flood control and carbon sequestration) must be equitably apportioned between landowners and the public at large. Bearing some costs, such as adherence to voluntary BMPs, are clearly in the landowners' best interest because it avoids more onerous and costly regulation by government. Bearing other costs demands greater altruism, such as extending rotation lengths (Ticknor 1992) or

investing in more aesthetically pleasing harvesting methods (Ticknor 1990; Stanturf et al. 1993). On the other hand, attempts to conserve biodiversity by preserving entire ecosystems (O'Connell and Noss 1992; Irwin and Wigley 1992) would place unreasonable burdens on private landowners if done by regulation without economic incentives or outright compensation.

Social Sustainability

Socially acceptable forest management can mean a target, a standard of excellence, or simply a tolerance threshold below which a manager dare not fall (Brunson 1993). In practice, social acceptance has meant a minimum standard of legal acceptability. Socially acceptable forest management on federal land in particular has been decided by the judiciary. If sustainable forest management is to be possible in this country, we must find new ways to achieve social acceptance. I believe this requires three changes in the way we set forest policy.

- We need to recognize and affirm the positive role of active forest management to support rural populations. Whether forests are manipulated to produce timber or wildlife, jobs are created and rural communities are sustained. Without year-round economies, most rural communities would disappear and could not service seasonal uses such as tourism and recreation. Even eco-tourism requires a local infrastructure, which is based on some form of natural resource extraction besides servicing tourists.
- We must achieve a social consensus on “present needs” that will be met by different kinds of forests, in terms of community types or ecosystems, age structure, and level of management intensity. This consensus must recognize our obligations not only to future generations, but to the present generation that includes the poor in developing countries [Goodland and Daly (1996) term this intergenerational and intragenerational sustainability]. This consensus must also recognize the key aspects of silvicultural and ecological, and economic sustainability already discussed. The task is formidable and probably never ending. The best we may hope for is a rough consensus with ongoing debate and refinement. A first step would be to achieve some level of agreement about the general nature of socially acceptable silviculture. Society has clearly rejected the notion of all-out timber production on every acre of commercial forest land. However, there is no audible repudiation of the opposite end of the spectrum that regards all human intervention as evil and any form of timber management as unacceptable.
- We must develop effective mechanisms for making tradeoff and resolving conflicts. Our society needs this in more areas than forest management, but it is clear to disinterested observers that the current system of making forest policy by judicial fiat simply does not work. Education plays an important role in shaping

individuals' beliefs and values, but "A person may behave as if a practice were unacceptable, regardless of personal opinion, in order to project a favorable image to important others...it is *group* positions that most often influence governments." (Brunson 1993; emphasis the author's). I believe the academic community has to provide the leadership in this arena. Any effort lead by a government agency, environmental interest group, or forest industry would be regarded with great suspicion by the others.

Determining what is socially acceptable in the context of sustainable forestry will be our greatest challenge. We might begin by seeking to achieve a rough consensus on a few contentious issues. At the top of my list are the following four issues.

How much natural forest must be preserved in the United States? Globally? If demand is a given (at least so it appears), and it is unethical (Bowyer 1991) and inherently unsustainable to simply lock up large areas of forest in the United States and mine timber elsewhere, then we must accept the necessity to manage some forest land for fiber. Where should the intensively managed production forests be?

Forest mining, a very contentious issue in the tropics, has occurred in the North America since European settlement and slash and burn agriculture was practiced before that by Native Americans. While we all recognize and deplore these practices, some advocate selective harvesting as the only sustainable forest management. In eastern hardwood forests today, improperly applied uneven-aged silviculture (diameter-limit cuts) has degraded stands until the only option is to clearcut and hope to regenerate something of value. In many cases, especially in the oak types, the advance reproduction of desirable species is lacking because the seed source has been removed. Harvesting without regard to the impact on regenerating the stand is mining the forest and unsustainable. Whatever silvicultural practices are regarded as sustainable must be based upon the best science available and not simply public preferences.

Clearcutting is a valid silvicultural technique under some circumstances but recent clearcuts look ugly under almost all circumstances. We must modify clearcutting to make it socially acceptable, or find alternative methods of even-aged management of desirable shade intolerant species.

Plantations are viewed in some quarters as inherently unsustainable. The argument is made that the investment of resources and energy that accompanies planting makes the operation unsustainable. The counter argument is made that intensive practices such as plantations reduce the pressure on natural forests to supply fiber.

A ROLE FOR THE FORESTRY COMMUNITY IN PENNSYLVANIA

The foregoing has tried to set the stage to answer the question posed in the title: What role should the forestry community in Pennsylvania play in defining and implementing sustainable forestry? I will recommend some actions to be taken by the entire forestry community, and some specifics for forest industry.

Professional forestry became established in the United States in reaction to clearly unsustainable practices (MacCleary 1995). Nowhere was this more evident than in Pennsylvania. Pennsylvania is forested today because the forestry profession came behind the forest miners, addressing concerns about wildfires and flooding. It is time that the forestry community in Pennsylvania regains the moral high ground. The fact remains that trees are the preeminent renewable resource, and the most environmentally benign raw material (Stanturf et al. 1993). As Smith (1996) points out, the real question is what other ways than production forestry are there for producing raw materials more sustainably?

We need to seek common ground with all parties interested in how forests are managed. The bunker mentality of us real foresters versus the envirofreaks will not allow civil discourse, let alone solve the contentious issues mentioned above. The Forestry Roundtable effort in Pennsylvania is an excellent example of the academic community fostering an environment in which all interested parties can come to the table to debate the issues.

The forestry profession, especially forest land managers, needs to be more open and accountable to the public. One way is to accept some participation by the public in making management decisions on private forest land (Owen 1997; Stanturf et al. 1993).

Develop Criteria and Indicators specific to Pennsylvania, under the Montreal Round. Use them to monitor performance and make the results public. This is not very different from BMPs, but it is more comprehensive and goes beyond the harvesting phase of management.

Help poor performers. Bad apples give everyone a poor reputation. While it will be a delicate maneuver to avoid antitrust problems, industry could use green certification as a tool to enforce general compliance with environmentally sound practices. This need not be third-party certification by groups such as the Forest Stewardship Council, Smart Wood (Rainforest Alliance) or Scientific Certification Systems (Ozanne and Vlosky 1996). Voluntary self-certification through industry's Sustainable Forestry Initiative or the ISO 14000 standard (Rhodes 1995) may provide the necessary guidance and recognition of sustainability principles.

Too many policies affecting forest management are made in response to interest groups without an economic stake in the outcome. With other states, Pennsylvania should

assume leadership for developing national policies on sustainable forestry. The Pennsylvania forestry community, lead perhaps by state government as it has been in forest-based economic development (Jones et al. 1996), should lead the nation in developing policies in five areas:

- Fiber self-sufficiency
- Land use allocations, especially at the rural urban interface
- Sustainable management of nonindustrial private forest lands
- Rehabilitation of degraded forest land, including high-graded stands and riparian zones
- Restoring marginal farmland to forest that is viable for timber production.

A ROLE FOR INDUSTRY

Forest industry in Pennsylvania would benefit by more active involvement in stewardship. There is a perception by some that industry regards the Stewardship Programs of the Bureau of Forestry as competitive with the industry-sponsored Sustainable Forestry Initiative. These programs are complementary and industry's landowner assistance foresters should work cooperatively with the state's service foresters to provide the greatest benefit to the landowner.

Industry should develop voluntary programs to certify management practices that are environmentally sound. Some combination of the ISO 14000 standard (Rhodes 1995) and the Sustainable Forestry Initiative (AFPA 1995, 1996) may be a more feasible approach than third-party certification. Industry, working with university and federal researchers, could develop and promote management practices that can be shown to be sustainable by the criteria set out above and by international standards.

Inviting the public to participate in decision processes on industry land may seem like a risky proposition but it could pay off handsomely in increased trust and understanding (Stanturf et al. 1993; Owen 1995).

Investments in more aesthetic harvesting methods could possibly blunt some criticism of even-aged management. Researchers in the eastern forest are evaluating the practice of deferring harvesting of some large, vigorous trees when a stand is renewed, purely for aesthetic reasons. Other techniques blur the distinction between classical even-aged and uneven-aged treatments, where the area of the removal cut is smaller than a clearcut but larger than a group selection cut. Termed variously a small patch clearcut or an irregular shelterwood, this technique seems to make regeneration of shade-intolerant species possible in a system that looks more like a selection harvest to the public.

Finally, the industry should actively promote sustainability. The SFI is a good start in that direction but it needs to be demonstrated on the ground, not just in the corporate

boardroom or in commercials.

LITERATURE CITED

- AFPA. 1995. Sustainable forestry, Principles and Implementation Guidelines. Washington, D.C. 9 pp.
- AFPA. 1996. Sustainable forestry for tomorrow's world. Washington, D.C. 32 pp.
- Backiel, A. 1995. Forests and sustainable development: The Rome statement on forestry. *Journal of Forestry* 93(10):13-17.
- Bowyer, J.L. 1991. Responsible environmentalism: The ethical features of forest harvest and wood use on a global scale. *Forest Perspectives* 1(4):12-14.
- Bowyer, J.L. 1992. Realistic thinking and the North American approach to environmental issues: A dichotomy. *Forest Products Journal* 42(10):18-24.
- Bowyer, J.L. 1994. Raw materials, environment, and developed nations. Pp. 8-15 *in* Proc. Pacific Timber Engineering Conference. Gold Coast, Australia.
- Brunson, M.W. 1993. "Socially acceptable" forestry: What does it imply for ecosystem management? *Western Journal of Applied Forestry* 8(4):116-119.
- Christensen, N.L., A.M. Bartuska, J.H. Brown, S. Carpenter, C. D'Antonio, R. Francis, J.F. Franklin, J. A. MacMahon, R.F. Noss, D.J. Parsons, C.H. Peterson, M.G. Turner, and R.G. Woodmansee. 1996. The report of the Ecological Society of America Committee on the scientific basis for ecosystem management. *Ecological Applications* 6(3): 665-691.
- Ehrlich, P.R. and J.P. Holdren. 1974. Impact of population growth. *Science* 171:1212-1217.
- Forest Products Society. 1993. A global challenge: Balancing the world's raw materials and environmental needs. Summary of the proceedings of an international forum Wood Product Demand and the Environment. Vancouver, British Columbia, Canada. 20 pp.
- Goodland, R. and Daly, H. 1996. Environmental sustainability: Universal and non-negotiable. *Ecological Applications* 6(4):1002-1017.

Irwin, L.L. and Wigley, T.B. 1992. Conservation of endangered species, the impact on private land. *Journal of Forestry* 90(8):27-30,42.

Jones, Stephen B.; Stanturf, John A.; and Smith, Stephen M. 1996. Forest-based economic development: a case study in the temperate hardwood region of North America. In S.K. Majumdar, E.W. Miller and Fred J. Brenner, Eds., *Forests - A Global Perspective*. Ch. 19:305-317.

Lee, L.K. 1996. Sustainability and land-use dynamics. *Journal of Soil and Water Conservation* (July-August):295.

Loftis, D.L. and McGee, C.E. Eds. 1993. Oak regeneration: Serious problems, practical solutions. Symposium Proceedings; 1992 September 8-10; Knoxville, TN. Gen. Tech. Rep. SE-84, Asheville, NC: US Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 319 pp.

MacCreary, D. 1995. Resiliency: The trademark of American forests. *Forest Products Journal* 45(1):18-28.

Mangold, R.D. 1995. Sustainable development: The Forest Service's approach. *J. For.* 93(11): 25-28.

O'Connell, M.A. and Noss, R.F. 1992. Private land management for biodiversity conservation. *Environmental Management* 16(4):435-450.

Owen, C. 1997. A forester's Top 10 predictions. *Journal of Forestry* 95(2):44.

Ozanne, L.K. and Vlosky, R.P. 1996. Wood products environmental certification: The United States perspective. *Forestry Chronicle* 72(2):157-165.

Rhodes, S. 1995. International environmental guidelines to emerge as the ISO 14000 series. *Tappi Journal* 78(9):65-66.

Solberg, B, D. Brooks, H. Pajuoja, T.J. Peck, and P.A. Wardle. 1996. Long-term trends and prospects in world supply and demand for wood and implications for sustainable development: A synthesis. European Forest Institute, Joensuu, Finland and Norwegian Forest Research Institute, As, Norway. 32 pp.

Stanturf, J.A., Jones, S.B., and Ticknor, W. D. 1993. Managing industrial forestland in a changing society. *Journal of Forestry* 91(11):6-8, 10-11.

Smith, D.M. 1996. Evidence about sustainability of production silviculture--Historical

perspective. Pp. 59-64 in Sustaining Forests. Proc. Society American Foresters National Convention, Bethesda, MD.

Swanson, F.J. and Franklin, J.F. 1992. New Forestry principles from ecosystem analysis of Pacific Northwest forests. *Ecological Applications* 2:262-274.

Ticknor, W.D. 1990. Practicing objective forestry in a subjective world. Unpubl. Paper presented at the American Forest Council Future of Forestry Conference, October 16, 1990, Washington, D.C.

Ticknor, W.D. 1992. Forestry for a changing nation: Commodities and sustained productivity. Pp. 41-46 in *American Forestry: An Evolving Tradition*. Proc. Society American Foresters National Convention, Bethesda, MD.

Toman, M.A. and P.M.S. Ashton. 1996. Sustainable forest ecosystems and management: A review article. *Forest Science* 42(3):366-377.

WBCSD. 1996. A changing future for paper. International Institute for Environment and Development, prepared for World Business Council for Sustainable Development, Geneva, Switzerland. 32 pp.

WCED. 1987. Our common future. World Commission on Environment and Development. Oxford University Press, Oxford, UK.

